CLAIMS

What is claimed is:

1. Use of a membrane in the purification of water containing least one of suspended solids, dissolved solids, pollutants, salts and biological materials,

wherein the membrane separates at least one of suspended solids, dissolved solids, pollutants, salts and biological materials from said water; retains at least one of suspended solids, dissolved solids, pollutants, salts and biological materials on one side of said membrane; and permits a differential transfer of water vapor across said membrane at a rate of at least 70 $g/m^2/24h$, and

wherein said water transfer rate is defined to be the amount of water transferred across the membrane per unit surface area of the membrane over a unit of time.

2. Use of a membrane in the purification of water containing least one of suspended solids, dissolved solids, pollutants, salts and biological materials, the membrane comprising a hydrophilic polymer layer.

3. Use of the membrane according to claim 2, wherein said hydrophilic polymer layer has a water vapor transmission rate according to ASTM E96-95 (Procedure BW) of at least $400g/m^2/24h$, measured using air at 23°C and 50% relative humidity at a velocity of 3 m/s on a film of total thickness 25 microns, this thickness being the total thickness of said hydrophilic membrane layer.

4. Use of the membrane according to claim 2, wherein the membrane comprises a polymer selected from: copolyetherester elastomers, polyether-block-polyamides, polyether urethanes, homopolymers and copolymers of polyvinyl alcohol, and mixtures thereof.

5. Use of the membrane according to claim 4, wherein the membrane comprises at least one copolyetherester elastomer having a multiplicity of

recurring long-chain ester units and short-chain ester units joined head-to-tail through ester linkages said long-chain ester units being represented by the formula

$$-OGO-\overset{\displaystyle O}{\overset{\|}{C}}-R-\overset{\displaystyle O}{\overset{\|}{C}}- \qquad \text{(I)}$$

and said short-chain ester units being represented by the formula:

$$-ODO-\overset{\displaystyle O}{\overset{\|}{C}}-R-\overset{\displaystyle O}{\overset{\|}{C}}- \qquad \text{(II)}$$

wherein:

G is a divalent radical remaining after the removal of terminal hydroxyl groups from a poly(alkylene oxide)glycol having a number average molecular weight of about 400-4000;

R is a divalent radical remaining after removal of carboxyl groups from a dicarboxylic acid having a molecular weight less than 300;

D is a divalent radical remaining after removal of hydroxyl groups from a diol having a molecular weight less than about 250;

the copolyetherester contains 0-68 weight percent based on the total weight of the copolyetherester, ethylene oxide groups incorporated in the long-chain ester units of the copolyetherester;

the copolyetherester contains about 25-80 weight percent short-chain ester units.

6. A method for purifying a water source containing at least one of suspended solids, dissolved solids, pollutants, salts, and biological materials, the method comprising the steps of:

providing a hydrophilic membrane, the membrane having a first surface adjacent a first volume and a second surface adjacent a second volume;

placing the water source in contact with the first surface;

ensuring that at least a humidity differential exists between the first volume and the second volume such that water permeates across the membrane from the first surface to the second surface and into the second volume in the form of vapor, and wherein

at least one of the suspended solids, dissolved solids, pollutants, salts and biological materials is retained by the membrane.

7. The method of purifying the water source according to claim 6, wherein the water source comprises a form selected from the group comprising: a vapor, a liquid, a vapor and liquid mixture, and an aqueous emulsion.

8. The method of purifying the water source according to claim 6, wherein said hydrophilic membrane layer permits a differential transfer of water vapor across said membrane at a rate of at least 70 $g/m^2/24h$, and

wherein said water transfer rate is defined to be the amount of water transferred across the membrane per unit surface area of the membrane over a unit of time.

9. The method of purifying the water source according to claim 6, wherein said hydrophilic membrane comprises a polymer having a water vapor transmission rate according to ASTM E96-95 (Procedure BW) of at least $400 g/m^2/24h$, measured using air at 23°C and 50% relative humidity at a velocity of 3 m/s on a film of total thickness 25 microns, this thickness being the total thickness of said hydrophilic membrane layer.

10. The method of purifying the water source according to claim 6, further comprising the step of:

utilizing the water vapor present at the second surface to augment humidity in the second volume.

11. The method of purifying the water source according to claim 6, further comprising the step of:

condensing water vapor present at second surface in the second volume.

12. The method of purifying the water source according to claim 6, wherein the second volume is an enclosed chamber.

13. A method for hydrating at least one of a food-stuff, a drug, and a dehydrated matter contained within a container, at least part of the container comprises a hydrophilic membrane, the method comprising the steps of:

placing the membrane in contact with a water source containing at least one of suspended solids, dissolved solids, pollutants, and biological materials, such that the membrane acts to purify water passed therethrough to hydrate at least one of said food-stuf, said drug, and said dehydrated matter.

14. A method for controlling the moisture content in a growing medium, the method comprising the steps of:

placing the membrane in contact with a water source containing at least one of suspended solids, dissolved solids, pollutants, and biological materials, such that the membrane acts to purify water passed therethrough to moisturize said growing medium.

15. An article comprising at least a food-stuff, a drug, and a dehydrated matter contained within a container, wherein at least part of the article is comprised of a hydrophilic membrane.

16. An article comprising at least a seed and a seedling contained within a container, wherein at least part of the container comprises a hydrophilic membrane.

17. A water purification system comprising:

a water source containing at least one of suspended solids, dissolved solids, pollutants, salts, and biological materials; and

a hydrophilic membrane in contact with the water source.

18. The water purification of claim 17, wherein:

the membrane comprises at least one layer of hydrophilic polymer.

19. The water purification of claim 17, wherein the water source comprises a form selected from the group comprising: a vapor, a liquid, a vapor and liquid mixture, and an aqueous emulsion.

20. The water purification of claim 17, wherein the system provides purified water in at least one of a liquid form and a vapor form to an environment supporting at least one of the germination, propagation, and growth of at least a seed, a seedling, and a plant.

21. The water purification system of claim 17, further comprising:

means for providing a differential pressure across the membrane.

22. The water purification system of claim 17, wherein:

the membrane has a first surface adjacent a first volume and a second surface adjacent a second volume and the water source contacts the first surface,

the system comprises at least a humidity differential between the first volume and the second volume such that water permeates across the membrane from the first surface to the second surface and into the second volume, and

wherein at least one of the suspended solids, dissolved solids, pollutants, salts and biological materials is retained in the first volume.

23. The water purification of claim 22, wherein the second volume is an enclosed chamber.

24. The water purification of claim 22, wherein water present at the second surface augments humidity in the second volume.

25. The water purification of claim 22, further comprising:

means for condensing water vapor extruded from the second surface in the second volume.

26. The article of claims 15 or 16 or the water purification system of claim 17, wherein the membrane permits a differential transfer of water vapor across said

membrane at a rate of at least 70 $g/m^2/24h$, and wherein said water transfer rate is defined to be the amount of water transferred across the membrane per unit surface area of the membrane over a unit of time.

27. The article of claims 15 or 16 or the water purification system of claim 17, wherein the membrane has a water vapor transmission rate according to ASTM test E96-95 (Procedure BW) of at least 400 $g/m^2/24h$, measured on a film of thickness 25 microns using air at 23°C and 50% relative humidity at a velocity of 3 m/s.

28. The article of claims 15 or 16 or the water purification system of claim 17, wherein the membrane comprises a polymer selected from copolyetherester elastomers, polyether-block-polyamides, polyether urethanes, homopolymers and copolymers of polyvinyl alcohol, and mixtures thereof.

29. The article of claims 15 or 16 or the water purification system of claim 17, wherein the membrane comprises at least one copolyetherester elastomer having a multiplicity of recurring long-chain ester units and short-chain ester units joined head-to-tail through ester linkages said long-chain ester units being represented by the formula

$$-OGO-\overset{\displaystyle O}{\overset{\|}{C}}-R-\overset{\displaystyle O}{\overset{\|}{C}}- \qquad (I)$$

and said short-chain ester units being represented by the formula:

$$-ODO-\overset{\displaystyle O}{\overset{\|}{C}}-R-\overset{\displaystyle O}{\overset{\|}{C}}- \qquad (II)$$

wherein:

G is a divalent radical remaining after the removal of terminal hydroxyl groups from a poly(alkylene oxide)glycol having a number average molecular weight of about 400-4000;

R is a divalent radical remaining after removal of carboxyl groups from a dicarboxylic acid having a molecular weight less than 300;

D is a divalent radical remaining after removal of hydroxyl groups from a diol having a molecular weight less than about 250;

the copolyetherester contains 0-68 weight percent based on the total weight of the copolyetherester, ethylene oxide groups incorporated in the long-chain ester units of the copolyetherester;

the copolyetherester contains about 25-80 weight percent short-chain ester units.